Chapter V – Public Sector Policies

Option 12: Adopt Energy Efficiency Requirements for State Agencies

Background

State-owned or leased facilities including higher education facilities consume approximately 10 percent of the electricity and natural gas consumed by all commercial sector customers in Utah. Governor Huntsman's Energy Efficiency Policy calls for state agencies to lead in meeting Utah's energy efficiency goal, thereby saving energy and saving taxpayer dollars. In 2006, the Utah State Legislature passed House Bill 80, directing the Division of Facilities Construction and Management (DFCM) to administer the State Building Energy Efficiency Program (SBEEP). This bill includes a number of provisions such as development of incentives, procurement of efficient products, requirements to track and analyze energy savings data, and reporting to the Governor and Legislature. The bill did not include energy saving targets or requirements. However, SBEEP is considering setting energy efficiency requirements on a "per agency" basis.

There are a number of examples of energy efficiency requirements in the public sector. At the national level, President Bush issued an Executive Order requiring Federal agencies to reduce energy intensity by 30 percent by the end of fiscal year 2015, relative to 2003 baseline energy intensity.[115] This is equivalent to a 2.5 percent annual improvement, on average. Previous Federal Executive Orders have been successful in achieving significant energy savings for federal agencies. For example, energy intensity (energy use per unit of floor area) in federal buildings declined 24 percent during 1985-2000.[116]

Some states have adopted energy intensity reduction requirements for state agencies. In 2003, Arizona adopted legislation requiring state agencies to reduce energy use per unit of floor area by ten percent by 2008 (with 2003 as the baseline), and an additional five percent by 2011.[117] The State of Texas has a five-year, 25-percent energy reduction target, meaning a reduction of five percent per year on average. The Texas target includes all public sector entities, i.e. both state and local government.[118] And Colorado Governor Bill Ritter recently issued an Executive Order directing state agencies to reduce energy consumption in 2011-2012 by 20 percent relative to energy use in 2005-2006.[119]

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[115] Executive Order: *Strengthening Federal Environmental, Energy, and Transportation Management*, January 24 2007, accessible online: http://www.whitehouse.gov/news/releases/2007/01/20070124-2.html, accessed August 8, 2007

[116] *Annual Report to Congress on Federal Government Energy Management and Conservation Programs Fiscal Year 2000*. Washington, DC: U.S. Department of Energy, Federal Energy Management Program, Dec. 13, 2002.

[117] Arizona 34-451. Energy conservation standards for public buildings. House Bill 2324, signed into law April 28, 2003.

[118] http://www.seco.cpa.state.tx.us/. Texas' compliance period is 2002-2007. The energy reduction targets in Texas are part of the state's larger efforts to reduce pollutant emissions for compliance with the federal Clean Air Act.

[119] Executive Order D0011-07, issued by Colorado Gov. Bill Ritter, Jr., April 16, 2007.

Limited capital or know-how can be constraints to implementing energy efficiency projects in the public sector. These constraints can be overcome by using energy service companies (ESCOs), third party financing, and performance contracting. A number of states have "ramped up" their energy efficiency investment in public buildings by utilizing this strategy.[120] For example, performance contracting and use of ESCOs has been an important strategy for upgrading public sector energy efficiency in Colorado.[121,122] However, performance contracting and ESCOs have not been widely utilized by public sector entities in Utah, in part because it reduces the economic benefits realized by the state from energy efficiency upgrades.

Specific Energy Efficiency Proposal

This policy proposes adoption of energy efficiency requirements for state agencies, including state universities and colleges. These requirements would be expressed as a reduction in energy usage per square foot of occupied floor area. We suggest mimicking the federal goals in Utah, meaning a reduction of 2.5 percent per year until 2015, i.e. requiring by 2015 a 20 percent reduction of relative energy use per unit of floor area as of 2007. We further suggest a nominal one percent reduction per year during 2016-2020.[123] Flexibility could be provided to agencies that have already achieved high levels of building thermal integrity and equipment efficiency. Additionally, requirements to purchase ENERGY STAR products could be implemented. The energy savings requirements could be established either through an Executive Order or through legislation.

In order to achieve the suggested requirements, we recommend employing the following strategies:

1. Increased use of energy benchmarking tools, such as EPA's ENERGY STAR benchmarking software, to analyze the energy efficiency of buildings relative to the national average. Use of this tool helps identify buildings that are highest priorities for action.

2. Maximizing utilization of incentive programs offered by Utah's electric and natural gas companies.[124]

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[120] N. Hopper, C. Goldman, D. Gilligan D. et al. 2007. *A Survey of the U.S. ESCO Industry: Market Growth and Development from 2000 to 2006.* LBNL-62679. Berkeley, CA: Lawrence Berkeley National Laboratory, May.

[121] State of Colorado Executive Order D 014 03, July 16, 2003. Energy Performance Contracting to Improve State Facilities, http://www.state.co.us/gov_dir/govnr_dir/exec_orders/d01403.pdf.

[122] Rebuild Colorado website, Governor's Energy Office, http://www.colorado.gov/rebuildco/success/state/dpa.htm. Also personal communication with Seth Portner, Colorado Governor's Energy Office, March 2007.

[123] These targets are lower that those seen in other leading states, i.e. Arizona, Colorado and Texas. This policy option includes a lower savings target in an attempt to avoid double counting the role of utility incentive programs.

[124] Note that energy savings resulting from utility DSM programs was not analyzed in this option.

3. Performance contracting, ESCOs, and tax-exempt lease-purchase agreements, enabling the public sector to implement energy-savings projects without government funding.

4. Full implementation of no-cost and low-cost measures, such as computer monitor power management and computer power management enabling software that can save 675 kWh per desktop computer per year.[125]

5. Hiring and training internal energy managers to seek energy conservation and efficiency projects, as well as review utility bills for errors and to identify opportunities to reduce demand charges through better building occupancy/use scheduling, and operations and maintenance changes. In a one-year period, one Utah School District saved over $40,000 by auditing its billing charges and fees.[126]

6. Awarding construction contracts based on lifecycle cost analysis and prohibiting construction change orders that would compromise energy-efficient design features and energy saving measures.

7. Creating incentives, such as allowing state agencies to keep a portion of the monetary benefits from energy saving projects.

Energy Savings

Table 12 presents our estimates of energy savings in state facilities from meeting the recommended efficiency requirements. We estimate that doing so would result in electricity savings of 253 GWh and natural gas savings of 1.4 million decatherms per year in 2015. The savings grow to 316 GWh and 1.8 million decatherms in 2020. These savings estimates are not adjusted to account for savings resulting from other policies such as expanded utility DSM programs or new efficiency standards.

Cost and Cost Effectiveness

We estimate that the State agency energy efficiency requirements would cut energy costs by $24.5 million in 2015 and $30.6 million in 2020 (undiscounted values). On a discounted net present value basis, the cumulative savings during 2007-2020 would be $165 million (2006 dollars). Assuming an average payback period of seven years, $113 million would be invested in energy efficiency measures during 2007-2015 to meet the energy intensity requirements; i.e., $14 million per year on average. Assuming an average measure lifetime of 20 years, the net economic benefit associated with efficiency measures installed during 2007-2015 would be $88 million (discounted net present value basis).

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[125] Savings based on 500 computers and monitors with electricity cost of $.0561/kWh using ENERGY STAR's online power management calculator: http://pmdb.cadmusdev.com/powermanagement/quickCalc.html.

[126] Personal communication with P. Barnes, Davis School District Energy and Utilities Manager, February, 2007.

Table 12 – Energy and Cost Savings from State Agency Energy Efficiency Improvements

Year	Electricity Savings (GWh per year)	Natural Gas Savings (million decatherms per year)	Energy Cost Savings[1] (million 2006 $)
2007	30	0.17	3.02
2008	56	0.31	5.67
2009	82	0.46	8.21
2010	**109**	**0.61**	**10.79**
2011	137	0.76	13.43
2012	165	0.92	16.13
2013	194	1.08	18.87
2014	223	1.24	21.67
2015	**253**	**1.40**	**24.53**
2016	265	1.47	25.70
2017	277	1.54	26.88
2018	290	1.61	28.10
2019	303	1.68	29.34
2020	**316**	**1.76**	**30.60**

1 - Undiscounted values.

Environmental and Social Benefits

Improving O&M procedures and performing energy retrofits will help meet comfort, health, and safety needs of building occupants. Implementing energy saving projects in many cases will enhance employee productivity and reduce absenteeism through better lighting and ventilation. Also, these projects tend to be labor intensive, thereby increasing local employment.

By cutting energy use, this policy option reduces pollutant emissions from power plants. Table 13 shows the estimated emissions reductions in 2015 and 2020. The reductions provide environmental benefits including reduced contribution to global global warming due to lower CO_2 emissions, improved air quality, and reduced regional haze that impacts Utah's scenic areas and national parks.

Political and Other Considerations

With the passage of the House Bill 80 in 2006, the success of energy intensity reduction requirements for federal agencies, and Utah's energy efficiency expertise in the Division of Facilities Construction and Management, Utah is poised to take the next step of adopting energy efficiency targets for state agencies. Adopting and complying with energy efficiency targets or requirements will require political will and cooperation throughout state government. This means securing a commitment to meet the targets on the part of department

heads and budget directors as well as gaining cooperation from state employees. It will require a commitment of additional staff, training, and software support.

Table 13 – Estimated Emissions Reductions from State Agency Energy Efficiency Improvements

Pollutant	Avoided Emissions in 2015	Avoided Emissions in 2020
Carbon dioxide (thousand metric itons)	244	305
SO_2 (short tons)	11.4	14.2
NOx (short tons)	70.7	88.4
Mercury (pounds)	1.0	1.3

Priority

This policy would result in significant electrical and natural gas savings as well as lower energy costs for state governments. It would demonstrate leadership by example, as well as save the state money. We recommend that it be viewed by the Governor and Legislature as a **high priority**.

Option 13: Support Energy Efficiency for Local Government and K-12 Schools, Including the Expansion of Utah's Revolving Loan Fund

Background

Municipal governments and school districts have taken a number of positive steps to increase energy efficiency and lower energy bills. For example, Salt Lake City and County have improved the energy efficiency of their buildings and facilities through lighting retrofits, cogeneration at the wastewater treatment plant, and requirements that new or renovated buildings meet the USGBC Leadership in Energy and Environmental Design (LEED) standards. Additionally, Salt Lake County has adopted a target to increase energy efficiency by four percent per year. However, there still exists a tremendous backlog of cost-effective energy efficiency projects in local government buildings and K-12 schools in Utah. Additional financial and technical assistance, as well as encouragement, are needed to help K-12 schools and local governments reap the benefits of greater energy efficiency.

Diverse funding mechanisms are available that can provide needed capital for energy efficiency projects by local governments and school districts. A revolving loan fund (RLF) is one such mechanism. In Utah's 2007 legislative session, a $5 million RLF was established for energy efficiency projects implemented in K-12 schools.[127] There are a number of other such funds around the United States, including funds in California, Idaho, Iowa, Missouri, Nebraska, Ohio, Oregon, and Texas. These funds typically feature below-market interest rates ranging from three to five percent, although zero interest loans also exist. When interest is charged it enables the fund to preserve its capital, thereby providing funding capacity over the long term.

Energy service companies (ESCOs) also provide funding for energy efficiency projects in the public sector while guaranteeing energy savings. A recent report by Lawrence Berkeley National Laboratory shows the important role ESCOs play in implementing public sector energy efficiency projects. The public sector market accounted for over 80 percent of the $2.5 billion in energy efficiency projects implemented by ESCOs in 2006.[128] Performance contracting with ESCOs provides both capital and technical expertise for implementing energy efficiency projects.

Specific Energy Efficiency Proposal

We suggest the adoption of a multi-pronged approach to support at least a 15 percent increase in energy efficiency in Utah's local government and K-12 schools by 2015. This goal could be accomplished through:

1. State collaboration with local governments and K-12 schools to support setting energy efficiency goals at the local level (possibly following the state agency efficiency targets proposed in Option 12);

[127] House Bill 351, Revolving Loan Fund for Certain Energy Efficient Projects, Rep. R. Barrus, http://le.utah.gov/~2007/htmdoc/hbillhtm/HB0351.htm.
[128] See Reference 120.

2. Expansion of the Revolving Loan Fund to $25 million and including local governments as an eligible entity;[129]

3. A full-time state-level staff person who would provide technical assistance to local governments and K-12 schools related to performance contracting and use of ESCOs.

This approach would assist schools and local governments in meeting future energy needs while saving taxpayers money and reducing capital constraints. While it would be difficult for the state to require energy efficiency improvements by local governments, the state can provide technical expertise and financial support. This collaboration would promote cooperation and information-sharing between governments toward mutually beneficial goals, namely cutting energy waste and lowering energy costs.

Energy Savings

In evaluating this option, we assume that 1.5 percent of projected energy consumption in local governments and K-12 schools is saved each year, on average. As shown in Table 14, this assumption results in 700,000 decatherms of natural gas and 168 GWh of electricity savings per year by 2015. The savings grow to 1.2 million decatherms of natural gas and 288 GWh of electricity per year by 2020.

Table 14 – Projected Energy Savings in Local Government and K-12 Schools

Year	Electricity Savings (GWh per year)	Natural Gas Savings (million decatherms per year)	Energy Cost Savings[1] (million 2006 $)
2008	20	0.08	1.9
2009	40	0.17	3.8
2010	**60**	**0.25**	**5.8**
2011	81	0.34	7.8
2012	102	0.43	9.8
2013	124	0.52	11.9
2014	146	0.61	14.1
2015	**168**	**0.70**	**16.2**
2016	191	0.80	18.4
2017	215	0.90	20.7
2018	238	1.00	23.0
2019	263	1.10	25.4
2020	**288**	**1.20**	**27.8**

1 -Undiscounted values.

[129] In the future, if demand for energy efficiency projects and loans is sustained, the fund could be increased to $50 million.

Cost and Cost Effectiveness

The cost of to the State for implementing this option through 2020 is approximately $21.5 million. This includes a one-time appropriation of $20 million for the RLF and a new state position to support the policy's implementation. We estimate that approximately $15 million needs to be invested in energy efficiency measures each year in order to meet the energy savings targets outlined above. We suggest that about one third of this, or $5 million per year, be provided by the expanded RLF. Financing for additional efficiency projects could come from ESCOs, municipal bonds, or other fund mechanisms available to local governments and school districts.

We assume that projects will have a payback period of seven years on average and that 60 percent of the energy savings would be in the form of electricity savings and 40 percent in natural gas.[130] The value of the energy savings statewide reaches over $16 million in 2015 and nearly $28 million in 2020 (undiscounted). Assuming efficiency measures have a 20-year lifetime on average, the net economic benefits from efficiency projects implemented during 2007-2015 is $67 million (discounted net present value).

Environmental and Social Benefits

Table 15 shows the estimated emissions reductions in 2015 and 2020. The environmental benefits from these emissions reductions include reduced contribution to global global warming, improved air quality, and reduced regional haze.

This option will also provide social benefits. By reducing energy costs, energy efficiency projects in the public sector enable school districts and local governments to increase their primary services (e.g., hire more teachers or spend more on other public sector efforts). Additionally, well-designed, energy-efficient school buildings improve the learning environment and student performance. In particular, high-quality daylighting in schools is associated with students achieving higher scores on standardized tests, as measured through sophisticated statistical analyses.[131]

Table 15 – Estimated Emissions Reduction in Local Government and K-12 Schools

Pollutant	Avoided Emissions in 2015	Avoided Emissions in 2020
Carbon dioxide (thousand metric tons)	150	257
SO_2 (short tons)	7.6	12.9
NOx (short tons)	47.1	80.5
Mercury (pounds)	0.7	1.2

[130] J. Osborn, C. Goldman, N. Hopper, and T. Singer. 2002. *Assessing U.S. ESCO Industry Performance and Market Trends: Results from the NAESCO Database Project*. LBNL-50304. Berkeley, CA: Lawrence Berkeley National Laboratory, Aug.

[131] L. Heschong and R.L. Wright. 2002. "Daylighting and Human Performance: Latest Findings." *Proceedings of the 2002 ACEEE Summer Study on Energy Efficiency in Buildings*. Washington, DC: American Council for an Energy-Efficient Economy. pp. 8.91-104.

Political and Other Considerations

This option is important to the success of Utah's public sector in meeting current and future energy efficiency goals and is important for fostering collaboration between governments. School districts and local governments in general should support this policy, as should private sector stakeholders such as contractors and ESCOs. The biggest obstacle is likely to be the additional appropriation for the RLF given the competition for state monies. In case expansion of the RLF is not possible, we recommend that local governments and K-12 school districts maximize their use of performance contracting (ESCOs) as well as utility DSM programs in order to leverage limited state dollars.

Priority

This policy would yield moderate electricity and natural gas savings as well as economic benefits. The policy could be especially helpful to local governments and schools, with notable social benefits. But the additional appropriation for the revolving loan fund could be problematic. We recommend that it be viewed by the Governor and Legislature as a **medium priority**.

Case Study 7:

ENERGY STAR Vending Machines: Davis School District, Farmington

Rising energy costs are a major concern for school districts across the country. In light of this challenge, many are trying to reduce the operating cost of lighting, appliances and other equipment. After Vender Misers proved unsuccessful, the Davis School District began contracting for ENERGY STAR vending machines. The District's Director of Utility Services began requiring these vending machines for a selection of their units beginning in 2006. A schedule was developed for replacing 221 machines by 2007.

Each of these energy-efficient vending machines reduces annual energy use by 1,800 kWh and saves the school district nearly $150, for an overall savings of over $33,000. The machines are also programmed to turn off their lights on nights and weekends.

Quick Facts

Annual energy savings: 398,000 kWh
Annual cost savings: $33,150
Annual Cost: Zero (put into place through contract requirements)
Number of units: 221 machines

Source: Davis School District, 2007 and U.S. Environmental Protection Agency, 2007

Option 14: Implement Energy Efficiency Education in K-12 Schools

Background

Educating Utah's children on energy efficiency through school curriculum will have long-range benefits for the entire state. Not only will educating our children today produce immediate energy and cost savings through the efficient use of energy, it will also foster an ethic of energy conservation that will improve energy usage patterns in the future and yield an adult population with a greater understanding of energy efficiency and conservation. The vital need for increased energy literacy is underscored by the National Energy Education Development Project, a national organization that develops energy education programs and materials:

> *Energy is the vital link between everything that happens in this world, but there is no single or simple world vision. Energy choices and challenges will become increasingly complicated as the nation and the world balance the expanding need for energy supply with the importance of increasing energy efficiency and conservation.*[132]

In Utah, three key entities are working to implement energy efficiency education in Utah's public schools: the National Energy Foundation (NEF), Utah Society for Environmental Education (USEE), and the Urban Trace-Gas Emissions Studies (UTES) Junior Partner Program. The UTES Program has successfully incorporated energy education into Utah's core curriculum on a pilot basis with several classes, demonstrating that energy and energy efficiency/conservation topics and activities can be tied into the Utah State Core Curriculum in the subjects of Language Arts, Social Studies, Science, and Mathematics.[133] One of the most successful trials to incorporate energy education into the classroom resulted in a sixth grade class receiving the 2006 President's Environmental Youth Award (PEYA).[134]

While the existing efforts of the aforementioned organizations are noteworthy and important, a sanctioned energy efficiency curriculum implemented statewide in all public schools would be a significant step towards achieving lasting transformations with regard to energy efficiency and conservation.

Specific Energy Efficiency Proposal

This proposal consists of four recommendations, which seek to expand and prioritize energy education in Utah's schools. These recommendations overlap and dovetail with other policy options presented, most notably Option 22.

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[132] National Energy Education Development Project, 2006 Annual Report, accessible online: http://www.need.org/needpdf/NEEDAnnualReport.pdf (accessed March 2007).
[133] Personal communication with D. Richerson, UTES Program, University of Utah, February 2007.
[134] 2006 President's Environmental Youth Awards, EPA Region 8, *Get Really Energy Efficient Now!*, Morningside Elementary GREEN Team; see: http://www.epa.gov/peya/peya2006.html#8 (accessed March 2007).

1. Initiate a statewide energy efficiency and conservation program for K-12 students in order to educate today's children, and tomorrow's adults. Efficiency and conservation segments should be incorporated into the energy curriculum taught in the 2nd, 5th, 6th, 8th and 9th grades.[135]

2. Allocate $100,000 per year for two years to develop and implement an energy efficiency education program for Utah's public schools. Since working relationships have already been developed between National Energy Foundation (NEF), Utah Society for Environmental Education (USEE), and the UTES program, free or low-cost materials and teacher training programs are readily available.

3. Direct the State Board of Education to incorporate energy efficiency modules into the state's core curriculum. Partnerships with strategic organizations (e.g. USEE, NEF), and key state agencies (e.g. Dept. of Environmental Quality) with experience preparing educational modules and professional development could be maintained to ensure that Utah's teachers have adequate resources to effectively implement this directive.

4. Establish an ongoing funding mechanism that will ensure the program's viability into the future. The State Office of Education could require that a percentage of the money saved through energy efficiency programs in Utah school districts (say 5 percent) be dedicated to curriculum development and teacher training. Alternatively, a small percentage (10-20 percent) from the yearly interest earned from Utah's Energy Efficiency Loan Fund could be dedicated to public school energy efficiency and conservation programs.

Energy Savings

Since this option focuses on increasing energy literacy of school children, it is very difficult to estimate energy savings or the permanence of any energy savings. For the purpose of this report, we assume that any resulting energy savings will be accounted for in the evaluation of Option 21.

Cost and Cost Effectiveness

Given that energy efficiency curriculum has already been created and successfully implemented on a pilot basis, the cost to tailor this model curriculum to meet the needs of Utah's public schools would be relatively minimal. We estimate that approximately $200,000 ($100,000 per year for two years) would be needed to create a Utah-specific curriculum and effectively implement the curriculum.

The overall cost-benefit ratio of educating Utah's students is not easily quantifiable. The cost of this option is arguably counter-balanced by the economic gain from energy and cost savings, but again the benefits are very difficult to quantify.

[135] See Utah State Core Curriculum: http://www.schools.utah.gov/curr/core/ (accessed February 2007).

Environmental and Social Benefits

This option will yield the significant social benefit of fostering energy efficiency literacy among future adults who will hopefully put into practice in their homes and workplaces some of what they learn in the classroom. In addition, some students may immediately take actions such as turning off lights and computers more consistently as well as urging their parents to conserve energy.

Political and Other Considerations

The need for energy education is never-ending as new children will always be entering schools. Implementing this option may be challenging due to the need to maintain energy efficiency education indefinitely and overcome barriers to modifying the state's core education curriculum. Other priorities such as preparing for standardized tests compete for limited curriculum space. In addition, professional development for teachers will be fundamental to the success of this option.

Priority

This option yields little or no measurable energy savings; however, energy education is complementary to many of the other policy options recommended. This option is a low-cost investment that could have a significant pay-off over the long run. We recommend that it be viewed as a **medium priority** by the Governor, Legislature, and State Office of Education.